

Erie Canal (Enlarged)
Schoharie Creek Aqueduct
Crossing Schoharie Creek 0.4 mile S.
of confluence with Mohawk River
Fort Hunter, Montgomery County,
New York

HAER No. NY-6

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PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Office of Archeology and Historic Preservation
National Park Service
U.S. Department of the Interior
Washington, D.C. 20240

HISTORIC AMERICAN ENGINEERING RECORD

ERIE CANAL (ENLARGED), SCHOHARIE CREEK AQUEDUCT HAER No. NY-6

Location: Crossing Schoharie Creek 0.4 mile SE of its confluence
with the Mohawk River.
Fort Hunter, Montgomery County, New York
Latitude: 42° 56' 22" N. Longitude: 74° 17' 12" W.

Date of Erection: 1841

Present Owner: New York State Historic Trust

Present Use: The aqueduct, now abandoned and only partially intact,
is to be structurally stabilized and made accessible
to the public as a historic monument, part of a state
park commemorating the Erie Canal installations at
Fort Hunter.

Significance: One of the major aqueducts of the enlarged Erie Canal,
the Schoharie Aqueduct replaced the difficult slackwater
crossing of the Schoharie Creek.

PART I. HISTORICAL INFORMATION

A. Physical History

1. Dates of construction: Begun in 1839, completed in 1841, and put into service in 1845.
2. Original and subsequent owner: New York State continuously.
3. Designer: John B. Jervis, C.E. was responsible for at least part of the basic aqueduct design. At the time of the canal's first enlargement he proposed a plan, henceforth adopted, of stone arches for the towing path and a timber trunk for the boat channel, its height above the river being insufficient for the rise of masonry arches. (Whitford, vol. 1, p. 800)
4. Builder: Incised on a stone in the tow path parapet: "BUILDER: OTIS EDDY 1841"

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5. Original purpose and construction: Before 1845 when the Erie Canal Aqueduct No. 5 was put into service, crossing the Schoharie Creek was a difficult and dreaded operation. The canal boats had to traverse the stream behind a dam using ropes and windlasses. Several dams were built at different times, but all proved inadequate especially when the waters were turbulent. The Schoharie Creek Aqueduct, part of the enlargement program initiated in 1836, was located slightly downstream from the slackwater crossing, between Locks No. 30 and No. 31, the realignment carrying the canal right through the center of Fort Hunter.
6. Alterations and enlargements: In 1855, a new timber trunk was built for the aqueduct costing \$32,899.68; it was again replaced in 1873 for \$44,070.12. (Whitford, Vol. 1, pp. 962, 967) All but the nine arches at the SW end were demolished c. 1915 to reduce impedance to stream flow, when the canal was abandoned upon completion of the New York State Barge Canal.

B. Other Erie Canal structures at Fort Hunter

1. Yankee Hill Lock No. 28

Builder's inscription:

LOCK No. 28
Archd. C. Powell Rest. Engr.
William Coleman & Co. Contractors
1841

2. Empire Lock No. 29

Built in 1841, it stands adjacent to the remains of Empire Lock No. 20, part of DeWitt Clinton's Big Ditch of 1822. Its 8-foot lift replaced the old 4-foot lock. Improvements were recorded in 1885.

C. Sources of Information

1. Unpublished sources:

Gayer, Albert E. A comprehensive collection of visual material on the Erie Canal Eastern Division structures. Schenectady, New York. (Mr. Gayer is founder and director of the Canal Society of New York State.)

Hutchinson, Holmes. MS vol. 9. Erie Canal map, pl. 39. 1834. New York State Library, Albany.

New York State Department of Transportation Archives. Book 11 (original title: Aqueducts vol. 1), 1893. State Campus, Albany.

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2. Published sources:

Canal Society of New York State. Bottoming Out: Useful and Interesting Notes Collected for Members of the Canal Society of New York State, 18-19 (1962). Syracuse.

New York State Engineer and Surveyor. Annual Report on the Canals of New York State for 1863. New York State Library, Albany.

Shaw, Ronald E. Erie Water West: A History of the Erie Canal 1792-1854. Lexington: University of Kentucky Press, 1966.

Sheehan, Edward J. A Prospectus for a New York State Canal Town Museum at Fort Hunter, New York. Fonda (New York), 1955. Mimeo pamphlet in MS Collection. New York State Library, Albany.

Veeder, David. The Original Erie Canal at Fort Hunter. Fort Hunter: Fort Hunter Canal Society, 1968.

Whitford, Noble E. History of the Canal System of the State of New York. vols. 1, 2. (Supplement to the Annual Report of the New York State Engineer and Surveyor.) Albany: Brandow Printing Company, 1906.

Prepared by R. Carole Huberman
Architectural Historian
September 1970

From notes by Robert M. Vogel
Curator
Division of Mechanical &
Civil Engineering
Smithsonian Institution

PART II. ENGINEERING INFORMATION

A. General Statement

1. Structural character: Extensive physical remains of an 1841 Roman-arch aqueduct built as part of the enlargement of the Erie Canal.
2. Condition of fabric: Good to poor. Nine of the original arches remain (on the southwest end); the others were demolished c. 1915 to reduce impedance to creek flow. There has been considerable subsidence and cracking in the two end arches due to lack of counter thrust from the demolished adjacent arches. All piers have settled heavily toward the towpath side from the eccentric loading resulting from absence of the weight of water on the trunk side.

B. Detailed description

1. Over-all dimensions: 415 feet (original length: 631 feet or 624 feet 3 inches (Whitford, p. 960); or 627 feet (1863 NYS Engineer's & Surveyor's Annual Report)) by 82 feet
2. Number of arches: 9 (originally 14)
3. Sub- and superstructure: Random ashlar masonry of light gray stone, similar to limestone. No trunk material remains.
4. Structural system: Stone arches supporting towpath. Span: \pm 39 feet; 45 feet on center; stone piers supporting the wooden trunk of the canal.

C. Site and Surroundings

1. Orientation: Northeast to southwest
2. Setting: Pleasant rural site which is presently being developed as a state park to include proximate Erie Canal structures.

Prepared by Richard J. Pollak
Professor of Architecture
Ball State University
20 August 1969

TECHNICAL ADDENDUM

NEW - YORK STATE CANALS.

1854.

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AQUEDUCT SPECIFICATIONS.

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GENERAL DESCRIPTION.

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The aqueducts to be composed of abutments with wing walls, and piers of substantial stone masonry, on which a trunk of timber and plank for the prism of the canal, and a towing path bridge is to be placed. The trunk of the aqueduct, when not otherwise directed, to be 50 feet wide and 7 feet deep, and the towing path to be 12 feet wide in the clear. The whole, except where rock occurs, to rest on a foundation of timber and plank; and when required by the Resident Engineer in charge of the work, bearing piles shall be driven to support and protect the foundation.

1st. SPECIFICATION. The foundation pit shall be excavated in such form and dimensions, and the earth from the same shall be deposited as may be required by said Engineer; and the bottom made smooth and even, to give a firm and uniform support to the foundation. If the material shall be removed 200 feet from the place excavated, and be deposited in a necessary bank, it shall be estimated both as excavation and embankment.

2d. SPECIFICATION. If the ground on which it is to be placed be such as to require bearing piles, the same shall be driven and secured to the foundation timbers, as the said Engineer shall direct. The foundation shall be composed of hemlock timber, from 10 to 12 inches thick, and not less than 12 inches in width, covered with hemlock plank, from 2 to 3 inches thick, as shall be required; the plank shall be well treenailed to the timbers with treenails 7 inches long for 2-inch plank, and 8 inches long for 3-inch plank; at each end of each plank, and at every three feet intermediate, there shall be two treenails for plank of ordinary width, and a corresponding increase in number for those of greater width. If rock be found in the foundation, then the timber and plank shall be wholly, or in part dispensed with, or varied in dimensions, as may be directed by said Engineer. In cases where it may be required by said Engineer, the foundation shall extend between and cover the spaces between the abutments and the piers. A course of sheet piling, from four to six feet long, shall be put down along the upper and lower sides of the foundation, and at such other parts as the said Engineer may direct. The manner of putting them down, shall be by excavating a ditch to the depth of the sheet piling, and placing the pile plank edge to edge, and spiking the head to the foundation timber, so as to render the work close and substantial. Except when otherwise directed, a lining course of inch boards shall be put over the plank, so as to break joints with them, and be secured by nails. Where the gravel or other earth is liable to be washed by floods, so as to fill or obstruct the channel for the passage of water under the aqueduct, a breast or dam of suitable masonry shall be carried up at the head or upper side of foundation, in such manner as may be directed by said Engineer; the fall over said dam or breast shall be protected by a second course of planking, either level or inclined, as may be directed: and if said Engineer shall direct, other erections of a similar character shall be made at points further up the stream, in all cases to be well guarded against injury from floods. The spaces between foundation timbers, and each side of sheet piling, and above breast wall shall be filled with fine clean gravel, well puddled in, or with concrete, as said Engineer shall direct.

3d. MASONRY. The front face of the abutments and side faces of the piers to be carried plumb in aqueducts of ordinary height and exposure; but those over large streams shall be battered, and have such recesses as the said Engineer may direct. The ends of the piers shall be battered from one-twelfth to one-ninth their rise; and in cases where it may be directed by said Engineer, the upper ends of the piers shall have a suitable slope from the foundation for ice breakers, which shall be coped with stone at least one foot in thickness, and have a length equal to the thickness of the pier, and if required shall be well secured with iron bolts in such

manner as shall be directed. The wing walls shall have a batter on the face of one-twelfth the height. Suitable pilasters shall, if directed, be carried up on the face of the wing walls. A buttress shall be formed at the exterior end, projecting one foot in the front, and in the rear from one to four feet beyond the wing wall, as may be directed by said Engineer; there shall also be a buttress in the rear, near the centre of the wing, which shall be four feet thick, and project from four to six feet back from the wing. The rear of the abutment and wings between the centre buttress, shall have a batter of one to six. That part of the abutments covered by the trunk shall be five feet thick at the bottom of the canal, and that part which is carried to or near the top bank level, shall be four and a half feet thick on the top, and increase in thickness towards the foundation by the batter above mentioned, and also by an offset of one foot on the rear, at every six feet down from the level of the canal bottom.

The wings to be four feet thick on the top, and increase downwards by the batter, and at the bottom level of the canal by an offset of one foot on the rear, and a similar offset at every six feet down, corresponding with the offsets in the abutments. The piers shall be from four to six feet thick. The top finishing of all the masonry shall be a coping of cut stone, not less than nine inches deep. That part of the abutments and piers under the trunk, shall have a course of coping alternately crossing the wall, and meeting in the centre, from each side of the walls. The spaces between the floor timbers shall, when required, be filled with rubble masonry. The remainder of the abutments and wings shall be coped with stone, that shall extend across the wall, and project forward to three inches over the face, and be not less than three feet wide in the direction of the wall. A recess for the toe of the braces shall be cut when directed by the said Engineer.

The masonry to be formed of sound, well shaped and durable stone, and laid in courses not less than twelve inches thick. The face stone shall be dressed to one-fourth of an inch joint on the beds, for the whole breadth of bed, and on the ends twelve inches, twelve inches back from the face.

The stretchers shall have a breadth of bed equal to the thickness or depth of the course, and in no case less than 18 inches; and the breadth from the front to the rear of the headers shall be in no case less than $\frac{2}{3}$ the thickness of the wall. One-fourth of the wall in front and rear of each course shall be occupied with headers, arranged on both sides to give the greatest stability to the work. In the larger aqueducts, one-third of the headers, or at least one-twelfth of the stone in each course, shall extend through the piers at each end. The ends of the piers shall be formed of one stone that shall fill the course, and be at least three feet long; and the next course of two stones, that shall make the width of the pier, and be at least four feet long; the ends to be composed of such alternate courses to the top. The same or larger sized stone shall be used in the courses of the abutments, at upper side of aqueduct. The upper courses of the coping to the breast and ice-breakers, shall be carefully beveled or rounded off as shall be directed. Where ice-breakers are to be constructed, this kind of work will not be required below the top of the same.

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The backing and interior wall shall be composed of large and well shaped stone, and in no case to be less than 6 inches thick, and three feet area of bed, and laid to form a good bond. The lower beds shall be dressed level and even, and all high projecting points hammered off from the top beds, so as to give the succeeding stone a firm bearing. In all cases the beds shall be properly prepared by leveling up before the next stone is laid; but no leveler shall be placed under a stone by raising it from its bed.

All the stone shall be well bedded in mortar, made of the best quality of hydraulic lime, and clean, sharp sand, and in such proportions, not more than two parts of sand to one of lime, as the said Engineer shall direct; and the vertical joints grouted with similar materials, and subject to the same directions; each course, as far as laid, shall be grouted fully before another is commenced, and spalls shall be filled in all the spaces after the grout is in. The masonry to be carried up in regular courses, and the work during its progress, shall, at no time, have more than two unfinished courses. The stone shall be kept wet and free from all dirt: no dressing shall be done upon a stone after it is laid. No cement shall be used until after it has been approved by the Engineer. Where rock-dressed masonry is required, a draft about one inch wide around the edge of each face stone shall be cut, and the rock projection shall not exceed three inches. When rock-dressed masonry is not required, the front of the wall shall be dressed to a smooth and even surface.

4th TRUNK. The trunk shall be composed of white oak, or white pine string timbers, of such dimensions, and placed at such distances apart as may be directed by the aforesaid Engineer.

The two outside stringers shall be placed so as to embrace the side post tenons, and give them a firm support. The side posts shall be white pine or white oak timber, 8 by 11-1/2 inches at the top, and 8 by 18 at the bottom shoulder, and placed 3 feet from centre to centre. The corner or end posts shall be white oak, and extend down three feet into the masonry, to give firmness to the corner of trunk. A white pine plate, 10 by 16 inches, shall be framed on the top of posts.

The bottom of the trunk, and the ends of the floor timbers in the abutments, to be covered with a course of two-inch white pine plank, of a good quality, to make water-tight joints, free from shakes and unsound knots; the plank to be well treenailed to the foundation timbers, with treenails 6 inches long, of suitable size to fill an aperture one inch in diameter. The sides shall be planked with three-inch white pine plank, of suitable quality, and grooved and tongued as may be directed, and secured to side posts with treenails 7 inches long, of suitable size to fill an aperture one inch in diameter. The sides and bottom of the trunk, if required, are to be braced from recesses to be cut in the masonry, in such manner as shall be directed.

When required to increase the waterway of the stream in which the aqueduct is located, the sides of the trunk to such extent as may be directed,

shall be constructed with posts and girths, and be planked vertically. Each side, for a length equal to the spaces between the piers, or the abutments and the piers, shall have two posts, one of which shall rest on a pivot and socket, and its upper end shall be secured by a collar and clamp: it shall have at least three girths and a roller or sheeve; shall be so secured to the under side of the lower girth as to roll on a circular rail plate of bar iron, which is to be let down level with, and secured to the floor: and the whole is to be so constructed as to furnish a practicable and easy movement to the side, when it shall be necessary to open the space by moving the side of the trunk around in line with the piers. Suitable recesses shall be formed in the corners of the piers nearest the trunk, to receive hollow quoins of wood and toe posts, the former of which are to be secured in their places by tenons, and screw bolts, firmly anchored in the walls.

When required to secure the floor of the trunk in case of opening the sides, recesses 8 inches deep and 10 inches wide shall be formed on the upper side of the floor timbers, over the centre of the piers and abutments, to receive a timber 8 by 10 inches square, which shall be secured in its place by bolts passing through and terminating at the top of the same, once in every 10 feet. The bolts shall be one inch square, and extend at least 3 feet into the masonry, and be firmly secured with an anchor, or by being driven with fox wedges, and be leveled as shall be directed. The top of each bolt shall have a screw, and the timber shall be held in its place by a nut and washer, so let in as to be even with the top.

TOWING PATH BRIDGE. To be 12 feet wide, and supported by white pine stringers, of such number, width and depth as said Engineer shall require, according to the span. A floor of white oak or red beech timber, 3 inches thick, to be laid on the stringers, and well treenailed to the same. A timber of hard wood, to be 6 by 8 inches, placed upon the inside end of the floor to guide the towline, and securely fastened to the front stringer. A suitable railing to be placed on the rear of the bridge, of such form and dimensions, and built of such material as the said Engineer shall direct. The railing to be planed and well painted.

The tie rods, screw-bolts and suspension-rods, with their appropriate straps, anchors, washers and nuts, shall be of first quality American wrought iron.

5th. For a more full and perfect explanation of the form, and dimensions of materials and parts, and of the manner of constructing the aqueducts in all their details, plans, with bills of timber and iron, will be furnished by the said Engineer; who will also give such directions, from time to time, during the progress of the work, as may appear to him necessary and proper, in order to make the work, in every respect, complete and perfect, on the plan contemplated in the above specifications. And the said plans, bills of timber and iron, and directions, shall, in every respect, be complied with.

(Transcribed from facsimile document in Division of Mechanical and Civil Engineering, National Museum of History and Technology, Smithsonian Institution, Washington, D. C.)

PART III. PROJECT INFORMATION

These records were prepared as part of the Mohawk-Hudson Area Survey, a pilot study for the Historic American Engineering Record which was established in 1969 under the aegis of the Historic American Buildings Survey. The project was sponsored jointly by the National Park Service (Historic American Buildings Survey), the Smithsonian Institution (National Museum of History and Technology), the American Society of Civil Engineers (National Headquarters and Mohawk-Hudson Section), and the New York State Historic Trust. The field work and historical research were conducted under the general direction of Robert M. Vogel, Curator of Mechanical and Civil Engineering, Smithsonian Institution; James C. Massey, Chief, Historic American Buildings Survey; and Richard J. Pollak, Professor of Architecture, Ball State University, Project Supervisor; and with the cooperation of the Department of Architecture, Rensselaer Polytechnic Institute.

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ERIE CANAL (ENLARGED), SCHOHARIE CREEK AQUEDUCT
Spanning Schoharie Creek
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